UltraForm Finisher Optical Mandrel Fabrication, Phase I

Completed Technology Project (2016 - 2016)

Project Introduction

The requirements for cost effective manufacturing and metrology of normal incidence and grazing incidence X-Ray optical surfaces is instrumental for the success of future NASA programs such as LISA, WFIRST, NGXO and X-ray Surveyor. Our plan in this Phase I effort would be to implement our UltraForm Finishing (UFF) (a sub-aperture compliant wheel and belt type polishing process for rapid material removal from the ground/machined state to a finished work piece), with a new work piece rotary axis configuration. The UFF rapidly removes residual grinding & cutter marks and sub-surface damage, while providing a robust solution for surface corrections on the required X-ray mandrels and cylindrical shells. Our UFF process was initially developed for high speed finishing of hard ceramic plano components and is now producing impressive test results for smoothing of critical aspheric components. OptiPro's technologically advanced optical manufacturing capabilities, along with our strong university and industry partnerships, gives us a very strong team and a clear path towards developing and commercializing the platforms which solve the difficult challenges associated with the fabrication of these large complex mirrors and cylindrical shells. The fabrication of shells with the electroforming process and glass replication process require very accurate mandrels. The proposed Phase I plan will include the design, manufacture and assembly of a precision rotary axis. The rotary axis will be tested on a host OptiPro UFF optical fabrication platform while polishing an Aluminum Mandrel. The part geometry will be measured with OptiPro's 'UltraSurf' a non-contact free-form measurement system. We envision that the work done during Phase I will be extended during Phase II to hyperbolic or elliptical shaped mirror surfaces. This research will position us with the information needed to develop the machine platforms needed for the fabrication and test of large mirrors and mandrels.

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Small Business Innovation Research/Small Business Tech Transfer

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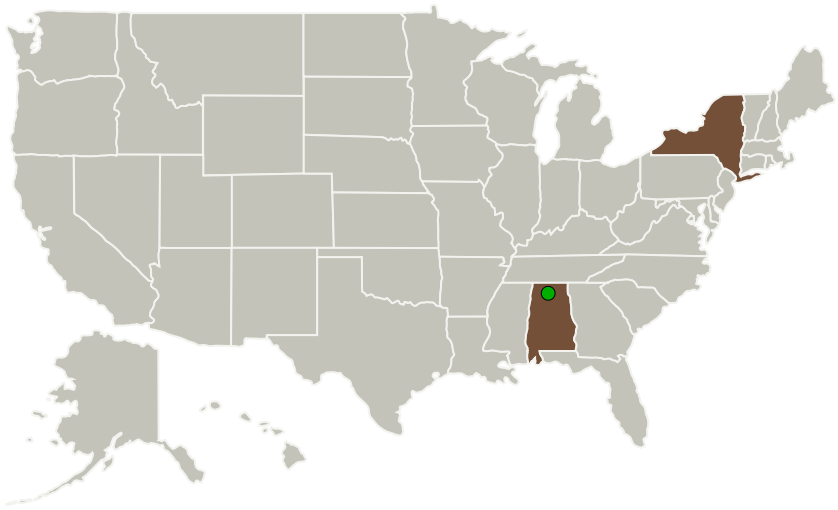
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
OptiPro Systems LLC	Lead Organization	Industry	Ontario, New York
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	New York

Project Transitions

June 2016: Project Start

December 2016: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140773)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

OptiPro Systems LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

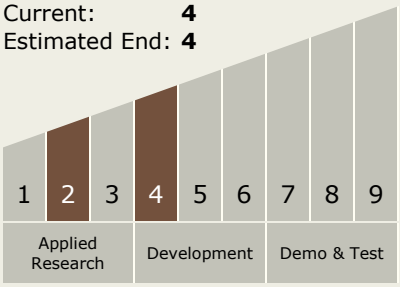
Carlos Torrez

Principal Investigator:

David Mohring

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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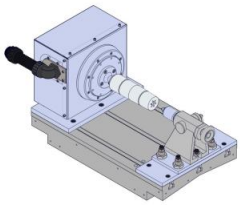
Images

Briefing Chart Image
UltraForm Finisher Optical Mandrel Fabrication, Phase I
(https://techport.nasa.gov/image/132378)



Final Summary Chart Image
UltraForm Finisher Optical Mandrel Fabrication, Phase I Project Image
(https://techport.nasa.gov/image/125926)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System